PB-246 857

LAKE BLACKSHEAR, CRISP, DOOLY, LEE, SUMPTER, AND WORTH COUNTIES, GEORGIA. EPA REGION IV

Pacific Northwest Environmental Research Laboratory

Prepared for:

National Environmental Research Center

June 1975

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

REPORT

ON

LAKE BLACKSHEAR

CRISP, DOOLY, LEE,

SUMPTER, AND WORTH COUNTIES

GEORGIA

EPA REGION IV

WORKING PAPER No. 283

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY

An Associate Laboratory of the

NATIONAL ENVIRONMENTAL RESEARCH CENTER - CORVALLIS, OREGON

and

NATIONAL ENVIRONMENTAL RESEARCH CENTER - LAS VEGAS, NEVADA

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REPORT
ON
LAKE BLACKSHEAR
CRISP, DOOLY, LEE,
SUMPTER, AND WORTH COUNTIES
GEORGIA
EPA REGION IV
WORKING PAPER No. 283

WITH THE COOPERATION OF THE
GEORGIA DEPARTMENT OF NATURAL RESOURCES
AND THE
GEORGIA NATIONAL GUARD
JUNE, 1975

TECHNICAL REPORT DATA *(Please read Instructions on the reverse before completing)*		
1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO. PB 246 857
4. TITLE AND SUBTITLE Report on Lake Blackshear, Crisp, Dooly, Lee, Sumpter, and Worth Counties, Georgia		5. REPORT DATE Prepared June 1975 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Anonymous (National Eutrophication Survey Staff)		8. PERFORMING ORGANIZATION REPORT NO. Working Paper # 283
9. PERFORMING ORGANIZATION NAME AND ADDRESS National Eutrophication Survey U.S. Environmental Protection Agency 200 S. W. 35th St. Corvallis, Oregon 97330		10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS Office of Research and Development U.S. Environmental Protection Agency 401 M Street, S. W. Washington, DC 20460		13. TYPE OF REPORT AND PERIOD COVERED Final - 1973 14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES
Prepared in cooperation with the U.S. Environmental Protection Agency, National Environmental Research Center, Las Vegas, Nevada 89114

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading	PRICES SUBJECT TO CHANGE	05B 05C

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Release unlimited		55
	20. SECURITY CLASS *(This page)*	22. PRICE 4.50-2.25

EPA Form 2220-1 (9-73)

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Georgia Department of Natural Resources for professional involvement and to the Georgia National Guard for conducting the tributary sampling phase of the Survey.

Joe D. Tanner, Commissioner of the Department of Natural Resources; J. Leonard Ledbetter, Director of the Environmental Protection Division; Ralph S. Howard, Jr., Environmental Affairs Coordinator; Gene B. Welsh, Chief of the Water Protection Branch; Edward T. Hall, Jr., Unit Coordinator; and Broughton A. Caldwell, R. Marshall Gaddis, William D. Kennedy, and Kenneth W. Martin, Environmental Specialists, provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary lake reports, and provided critiques most useful in the preparation of this Working Paper series.

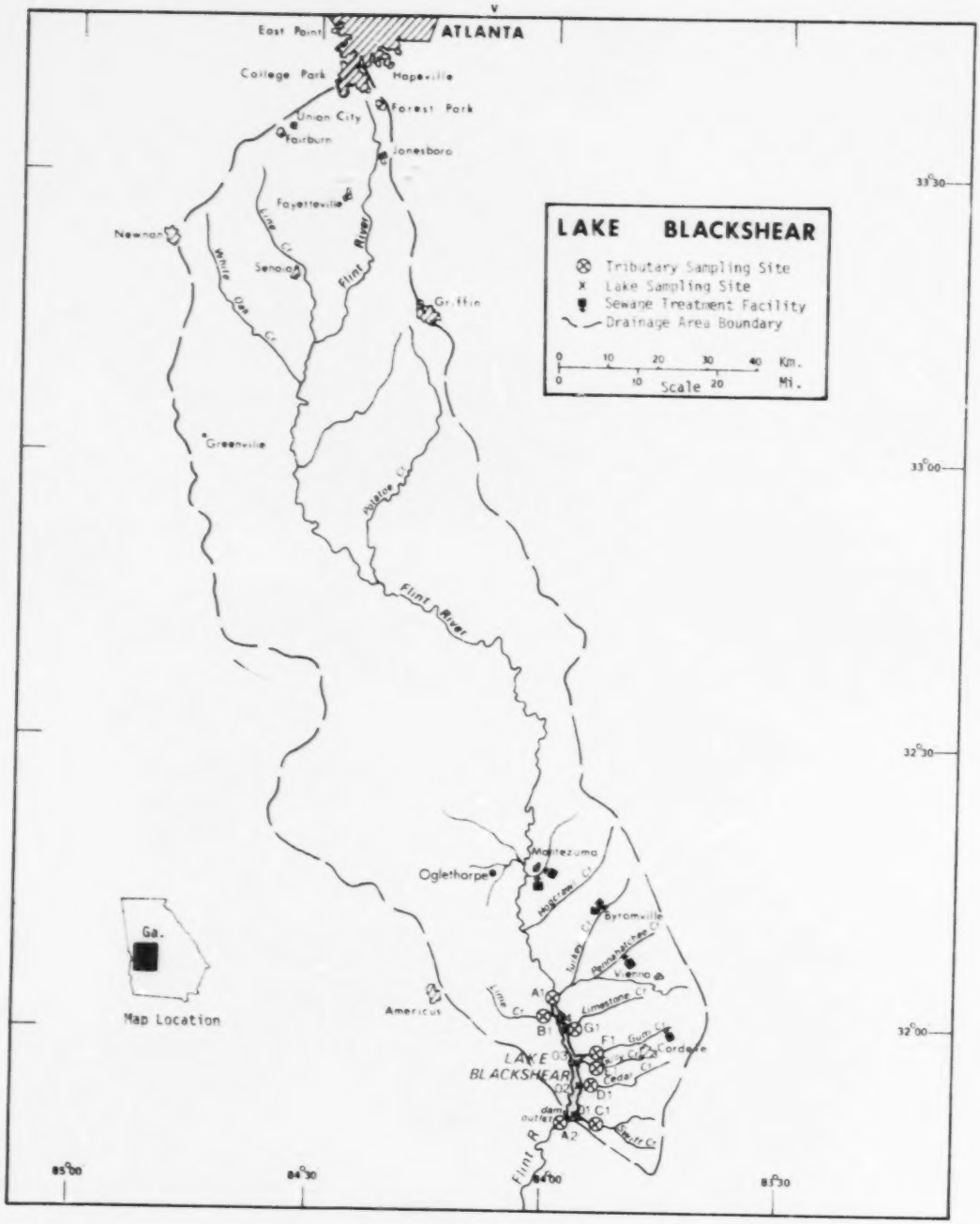
Major General Joel B. Paris, III, then the Adjutant General of Georgia, and Project Officer Lt. Colonel John R. Ranier, who directed the volunteer efforts of the Georgia National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF GEORGIA

LAKE NAME	COUNTY
Allatoona	Bartow, Cherokee, Cobb
Blackshear	Crisp, Dooly, Lee, Sumpter, Worth
Blue Ridge	Fannin
Burton	Rabun
Chatuge	Towns, GA; Clay, NC
Clark Hill	Columbia, Elbert, Lincoln, McDuffie, Wilks, GA; Abbeville, McCormick, SC
Harding	Harris, GA; Chambers, Lee, AL
Hartwell	Franklin, Hart, Stephens, GA; Anderson, Oconee, Pickens, SC
High Falls	Butts, Lamar, Monroe
Jackson	Butts, Jasper, Newton
Nottely	Union
Seminole	Decatur, Seminole, GA; Jackson, FL
Sidney Lanier	Dawson, Forsyth, Gwinnett, Hall, Lumpkin
Sinclair	Baldwin, Hancock, Putnam
Walter F. George	Clay, Quitman, Stewart, GA; Barbour, Henry, Russell, AL


LAKE BLACKSHEAR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
0 10 20 30 40 Km.
0 10 Scale 20 Mi.
East Point
ATLANTA
College Park
Hapeville
Forest Park
Union City
Fairburn
Jonesboro
Fayetteville
Newnan
Senoia
Griffin
Greenville
Flint River
Ga.
Map Location
Ogletharpe
Montezuma
Byromville
Vienna
Americus
LAKE BLACKSHEAR
Cordele
Flint R.
85°00
84°30
84°00
83°30
33°30
33°00
32°30
32°00

LAKE BLACKSHEAR*

STORET NO. 1302

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Lake Blackshear is eutrophic. It ranked eighth in overall trophic quality when the 14 Georgia lakes sampled in 1973 were compared using a combination of six parameters. Eight of the lakes had less median total phosphorus, 11 had less median dissolved phosphorus, and nine had less median inorganic nitrogen. While none of the lakes had less mean chlorophyll a, all had greater mean Secchi disc transparency, and it is likely that the turbidity noted by Survey limnologists at all sampling stations and times inhibited algal growth and resulted in the relatively low chlorophyll a concentrations. However, the Gum Creek embayment has a history of problem algal blooms (Anonymous, 1973a; Hall, 1975).

Lake Blackshear was not thermally stratified when sampled, but dissolved oxygen was below saturation in all samples taken. For example, in the shallowest samples analyzed for dissolved oxygen (1.5 m), percent saturation ranged from 58 to 67 in June, from 78 to 87 in September, and from 90 to 93 in November. In the deeper samples, dissolved oxygen was as low as 42% of saturation.

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* Table of metric conversions--Appendix A.
** See Appendix B.

Lake Blackshear was drawn down about four meters and was maintained at that level from August to early December for tree removal (Hall, op. cit.). While the draw-down may have influenced some of the parameters measured, there appears to be little question as to the eutrophic nature of the lake.

B. Rate-Limiting Nutrient:

Results of the algal assay indicate that phosphorus was limiting at the time of sample collection (06/22/73). The lake data indicate phosphorus limitation in September as well but nitrogen limitation in November.

C. Nutrient Controllability:

1. Point sources--The total phosphorus contributions of the point sources within the 40-kilometer Survey limit* amounted to 10.9% of the total load to Lake Blackshear during the sampling year. The City of Cordele contributed 7.3% of the total load; and the communities of Montezuma, Byronville, Oglethorpe, and Vienna collectively contributed an estimated 2.8%.

The present loading rate of 9.78 $g/m^2/yr$ is nearly five times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic rate (see page 15). However, the mean hydraulic retention time of Lake Blackshear at normal pool

* See Working Paper No. 175, "...Survey Methods, 1973-1976".

level is a short 16 days, and Vollenweider's model may not apply. Nonetheless, the existing trophic condition of the lake is evidence of excessive nutrient loads.

It is calculated that even complete removal of phosphorus at the point sources noted above would only reduce the total phosphorus load to Lake Blackshear by 10% and would reduce the loading rate to 8.79 $g/m^2/yr$. While institution of phosphorus removal at the immediate sources should be the first step in improving the trophic condition of the lake, particularly in the Gum Creek embayment, it appears that a phosphorus control program in the entire Flint River drainage basin upstream from the lake is needed if a significant change in the trophic condition of the lake as a whole is to be accomplished.

2. Non-point sources--Nearly 90% of the total phosphorus load reaching the lake during the sampling year is calculated to have been contributed by non-point sources. The Flint River contributed 83.8% of the total, and Gum Creek contributed 2.8%. The remaining five gaged tributaries collectively contributed about 2.5%.

During the sampling year, the phosphorus export rates of the Flint River (32 $kg/km^2/yr$), Gully Creek (41 $kg/km^2/yr$), and Gum Creek (48 $kg/km^2/yr$) were appreciably higher than the mean

of the export rates of the other four tributaries (14 kg/km^2/yr; see page 16).

The drainage area of the Flint River above Lake Blackshear is nearly 9,000 km^2 and there are point sources in the drainage beyond the 40-kilometer limit of the Survey (Anonymous, 1972b); e.g., the Atlanta Flint River and Clayton County wastewater treatment plants (combined population equivalence of 90,000; Anonymous, 1972a). These and other point sources contribute to the Flint River phosphorus export and would require phosphorus control as noted above.

The higher phosphorus export rate of Gum Creek may have been due to occasional by-passing of sewage at the Cordele wastewater treatment plant as is documented in a report by the Georgia Department of Natural Resources (Anonymous, 1973a). In that investigation, it was also found that areal drainage from the Gold Kist Fertilizer Company plant site near Cordele contained significant levels of phosphorus in the two samples taken (3.3 mg/l on June 28 and 1.4 mg/l on August 30, 1973). Drainage flows were not determined, however, and the magnitude of this phosphorus contribution to Gum Creek is not known.

Gully Creek drains an area adjacent to the City of Cordele, and the higher phosphorus export rate of this stream may be due to urban contributions. However, nearby Cedar Creek, which drains even more of the Cordele urban area, had a relatively

low phosphorus export rate of 12 kg/km^2/yr, so it seems likely that the Gully Creek phosphorus load is due either to differences in land-use practices, to point-source contributions, or both.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry†:

1. Surface area: 34.46 kilometers^2.
2. Mean depth: 5.3 meters.
3. Maximum depth: 13.7 meters.
4. Volume: 182.638 x 10^6 m^3.
5. Mean hydraulic retention time: 16 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Flint River	8,780.1	126.0
Lime Creek	176.1	2.0
Swift Creek	152.8	1.7
Cedar Creek	114.0	1.3
Gully Creek	38.8	0.4
Gum Creek	194.2	2.2
Limestone Creek	62.2	0.8
Minor tributaries & immediate drainage -	159.8	1.8
Totals	9,678.0	136.2

2. Outlet -

Flint River	9,712.5**	136.2

C. Precipitation***:

1. Year of sampling: 117.6 centimeters.
2. Mean annual: 126.1 centimeters.

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† At normal pool level; Hall, 1974.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Lake Blackshear was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from a number of depths at four stations on the lake in the spring and summer and from three stations in the fall (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the four stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 10.7 meters at station 1, 10.7 meters at station 2, 6.1 meters at station 3, and 3.7 meters at station 4. It is noted that the lake was drawn down about four meters during the summer and fall (Hall, 1975).

The results obtained are presented in full in Appendix D and summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR BLACKSHEAR LAKE
STORET CODE 1302

PARAMETER	1ST SAMPLING (6/22/73) 4 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (9/ 7/73) 4 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (11/ 8/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	26.8 - 28.0	27.4	27.4	27.9 - 30.2	28.7	28.4	16.5 - 16.8	16.7	16.6
DISS OXY (MG/L)	3.3 - 5.4	4.5	4.5	3.8 - 6.6	5.8	5.9	8.6 - 9.0	8.9	9.0
CNDCTVY (MCROMO)	55. - 81.	61.	59.	56. - 64.	60.	60.	46. - 48.	48.	48.
PH (STAND UNITS)	6.9 - 7.3	7.1	7.1	7.0 - 7.4	7.3	7.3	7.0 - 7.8	7.5	7.6
TOT ALK (MG/L)	10. - 28.	16.	16.	17. - 25.	20.	20.	20. - 27.	24.	23.
TOT P (MG/L)	0.062 - 0.103	0.081	0.085	0.019 - 0.038	0.023	0.021	0.029 - 0.039	0.034	0.035
ORTHO P (MG/L)	0.007 - 0.063	0.016	0.012	0.008 - 0.021	0.012	0.010	0.014 - 0.024	0.020	0.022
NO2+NO3 (MG/L)	0.280 - 0.440	0.318	0.310	0.140 - 0.200	0.172	0.170	0.170 - 0.190	0.180	0.180
AMMONIA (MG/L)	0.130 - 0.260	0.155	0.160	0.030 - 0.080	0.059	0.060	0.060 - 0.070	0.062	0.060
KJEL N (MG/L)	0.400 - 1.000	0.543	0.450	0.200 - 1.000	0.414	0.300	0.200 - 0.600	0.256	0.200
INORG N (MG/L)	0.430 - 0.640	0.483	0.465	0.170 - 0.280	0.231	0.230	0.230 - 0.260	0.242	0.240
TOTAL N (MG/L)	0.690 - 1.280	0.861	0.825	0.340 - 1.160	0.586	0.490	0.370 - 0.790	0.436	0.380
CHLRPYL A (UG/L)	1.2 - 2.5	1.8	2.0	1.9 - 4.0	2.5	2.1	0.7 - 1.0	0.8	0.8
SECCHI (METERS)	0.3 - 0.8	0.5	0.4	0.4 - 1.4	1.0	1.0	0.9 - 1.2	1.0	1.0

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal units per ml
06/22/73	1. Coccoid Chrysophyta	17
	2. Euglena	8
	3. Flagellates	8
	4. Stauroneis	8
	Total	41
09/07/73	1. Schroederia	55
	2. Synedra	55
	3. Oscillatoria	55
	4. Dinobryon	28
	5. Asterionella	28
	Total	221
11/08/73	1. Kirchneriella	281
	2. Chroococcus	156
	3. Navicula	62
	4. Raphidiopsis	62
	5. Mallomonas	62
	Other genera	95
	Total	718

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
06/22/73	01	2.1
	02	1.9
	03	2.5
	04	1.2
09/07/73	01	4.0
	02	2.3
	03	2.0
	04	1.9
11/08/73	01	1.0
	02	0.8
	03	0.7
	04	-

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.009	0.300	0.3
0.010 P	0.019	0.300	5.3
0.020 P	0.029	0.300	8.6
0.050 P	0.059	0.300	10.0
0.025 P + 0.5 N	0.034	0.800	13.5
0.050 P + 1.0 N	0.059	1.300	26.8
1.0 N	0.009	1.300	0.3

2. Filtered and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.005	0.281	0.1
0.010 P	0.015	0.281	3.9
0.020 P	0.025	0.281	7.3
0.050 P	0.055	0.281	9.2
0.025 P + 0.5 N	0.030	0.781	11.2
0.050 P + 1.0 N	0.055	1.281	24.2
1.0 N	0.005	1.281	0.1

3. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential primary productivity was low to moderate at the time the sample was taken (06/22/73). The yield responses to increasing levels of phosphorus spikes indicate that phosphorus was limiting. Note that there was no change in yield when only nitrogen was added.

The lake data indicate phosphorus limitation during the June and September sampling periods and nitrogen limitation during the November sampling (i.e., the mean N/P ratios were 30/1 and 19/1 during the June and September sampling periods, respectively, and 12/1 during the November sampling period).

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Georgia National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Georgia District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Stream nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated by using the means of the nutrient loads, in kg/km^2/year, at stations B-1, C-1, and D-1 and multiplying the means by the ZZ area in km^2.

The operators of the Cordele and Montezuma #1 and #2 wastewater treatment plants provided monthly effluent samples and corresponding flow data. Nutrient loads from the villages of Byromville and Vienna were estimated at 1.134 kg P and 3.401 kg N/capita/year. Nutrient

* See Working Paper No. 175.

loads from Oglethorpe, which has no treatment, were estimated at 1.587 kg P and 4.263 kg N/capita/year.

A. Waste Sources:

1. Known municipal† -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Cordele	11,000	trickling filter	9,462.5	Gum Creek
Montezuma #1	4,000	prim. clarifier	791.1	Spring Creek
Montezuma #2	80	act. sludge + ponds	2,835.0††	Spring Creek
Byromville	419*	stab. pond	158.6**	Turkey Creek
Vienna	2,341*	stab. pond	886.1**	Pennahatchee Creek
Oglethorpe	1,286*	none	486.8**	Mill Creek/ Flint River

2. Known industrial*** -

Name	Product	Treatment	Mean Flow (m^3/day)	Receiving Water
Gold Kist Fertilizer Co., Cordele	fertilizer	(areal drainage)	?	Drainage ditch/ Gum Creek

† Anonymous, 1971; treatment plant questionnaires.
†† Includes vegetable-processing wastes.
* 1970 Census.
** Estimated at 0.3785 m^3/capita/day.
*** Anonymous, 1973a.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Flint River	282,570	83.8
Lime Creek	2,345	0.7
Swift Creek	1,850	0.5
Cedar Creek	1,415	0.4
Gully Creek	1,590	0.5
Gum Creek	9,360	2.8
Limestone Creek	1,170	0.3
b. Minor tributaries & immediate drainage (non-point load) -	1,970	0.6
c. Known municipal STP's -		
Cordele	24,740	7.3
Montezuma #1	1,555	0.5
Montezuma #2	2,600	0.8
Byromville	475	0.1
Vienna	2,655	0.8
Oglethorpe	2,040	0.6
d. Septic tanks* -	140	<0.1
e. Known industrial -		
Gold Kist Fertilizer Co.	?	-
f. Direct precipitation** -	605	0.2
Total	337,080	100.0

2. Outputs -

Lake outlet - Flint River 202,050

3. Net annual P accumulation - 135,030 kg.

* Estimate based on 440 seasonal and 29 permanent lakeshore dwellings and 1 campground; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/ yr	% of total
a. Tributaries (non-point load) -		
Flint River	4,675,115	89.4
Lime Creek	50,015	1.0
Swift Creek	94,520	1.8
Cedar Creek	46,590	0.9
Gully Creek	32,165	0.6
Gum Creek	116,200	2.2
Limestone Creek	30,445	0.6
b. Minor tributaries & immediate drainage (non-point load) -	69,885	1.3
c. Known municipal STP's -		
Cordele	48,370	0.9
Montezuma #1	4,670	0.1
Montezuma #2	5,270	0.1
Byromville	1,425	<0.1
Vienna	7,960	0.1
Oglethorpe	5,480	0.1
d. Septic tanks* -	5,185	0.1
e. Known industrial -		
Gold Kist Fertilizer Co.	?	-
f. Direct precipitation** -	37,205	0.7
Total	5,230,500	100.0

2. Outputs -

Lake outlet - Flint River 2,262,705

3. Net annual N accumulation - 2,967,795 kg.

* Estimate based on 440 seasonal and 29 permanent lakeshore dwellings and 1 campground; see Working Paper No. 175.
** See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Flint River	32	532
Lime Creek	13	284
Swift Creek	12	619
Cedar Creek	12	409
Gully Creek	41	829
Gum Creek	48	598
Limestone Creek	19	489

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	9.78	3.92	151.8	86.1

Vollenweider loading rates for phosphorus (g/m^2/yr) based on mean depth and mean hydraulic retention time of Lake Blackshear:

"Dangerous" (eutrophic rate)	2.10
"Permissible" (oligotrophic rate)	1.05

V. LITERATURE REVIEWED

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VII. APPENDICES

APPENDIX A

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	1316	BLUE RIDGE LAKE	524
2	1318	BURTON LAKE	523
3	1303	CHATUGE LAKE	424
4	1311	NOTTELY RESERVOIR	393
5	1310	LAKE SIDNEY LANIER	385
6	1304	CLARK HILL RESERVOIR	309
7	1301	ALLATOONA RESERVOIR	286
8	1302	BLACKSHEAR LAKE	284
9	1313	SINCLAIR LAKE	254
10	1312	LAKE SEMINOLE	253
11	1319	HIGH FALLS LAKE	192
12	1314	LAKE EUFAULA	184
13	1309	JACKSON LAKE	116
14	1317	LAKE HARDING	77

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS P
1301	ALLATOONA RESERVOIR	0.020	0.150	443.167	7.489	14.900	0.005
1302	BLACKSHEAR LAKE	0.035	0.250	468.091	1.855	11.700	0.014
1303	CHATUGE LAKE	0.014	0.110	382.778	6.339	14.900	0.005
1304	CLARK HILL RESERVOIR	0.024	0.150	439.250	6.715	14.900	0.007
1309	JACKSON LAKE	0.094	0.530	461.385	14.577	14.800	0.027
1310	LAKE SIDNEY LANIER	0.016	0.180	396.417	5.431	14.900	0.004
1311	NOTTELY RESERVOIR	0.015	0.130	405.667	6.656	14.900	0.004
1312	LAKE SEMINOLE	0.040	0.405	456.133	6.760	11.800	0.010
1313	SINCLAIR LAKE	0.028	0.230	440.667	8.006	14.900	0.005
1314	LAKE EUFAULA	0.048	0.345	457.667	9.083	14.400	0.011
1316	BLUE RIDGE LAKE	0.010	0.105	394.889	3.078	13.000	0.004
1317	LAKE HARDING	0.114	0.640	467.538	7.438	14.900	0.045
1318	BURTON LAKE	0.007	0.100	363.889	2.733	14.900	0.003
1319	HIGH FALLS LAKE	0.047	0.115	459.444	15.075	14.900	0.009

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS P	INDEX NO
1301	ALLATOONA RESERVOIR	62 (8)	54 (7)	46 (6)	31 (4)	31 (0)	62 (7)	286
1302	BLACKSHEAR LAKE	38 (5)	31 (4)	0 (0)	100 (13)	100 (13)	15 (2)	284
1303	CHATUGE LAKE	85 (11)	85 (11)	92 (12)	69 (9)	31 (0)	62 (7)	424
1304	CLARK HILL RESERVOIR	54 (7)	62 (8)	62 (8)	54 (7)	31 (0)	46 (6)	309
1309	JACKSON LAKE	8 (1)	8 (1)	15 (2)	8 (1)	69 (9)	8 (1)	116
1310	LAKE SIDNEY LANIER	69 (9)	46 (6)	77 (10)	77 (10)	31 (0)	85 (10)	385
1311	NOTTELY RESERVOIR	77 (10)	69 (9)	69 (9)	62 (8)	31 (0)	85 (10)	393
1312	LAKE SEMINOLE	31 (4)	15 (2)	38 (5)	46 (6)	92 (12)	31 (4)	253
1313	SINCLAIR LAKE	46 (6)	38 (5)	54 (7)	23 (3)	31 (0)	62 (7)	254
1314	LAKE EUFAULA	15 (2)	23 (3)	31 (4)	15 (2)	77 (10)	23 (3)	184
1316	BLUE RIDGE LAKE	92 (12)	92 (12)	85 (11)	85 (11)	85 (11)	85 (10)	524
1317	LAKE HARDING	0 (0)	0 (0)	8 (1)	38 (5)	31 (0)	0 (0)	77
1318	BURTON LAKE	100 (13)	100 (13)	100 (13)	92 (12)	31 (0)	100 (13)	523
1319	HIGH FALLS LAKE	23 (3)	77 (10)	23 (3)	0 (0)	31 (0)	38 (5)	192

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR GEORGIA 1/9/75

LAKE CODE 1302 MICHIGAN LAKE

TOTAL DRAINAGE AREA OF LAKE(SQ KM) = 9712.5

TRIBUTARY	SUM-DRAINAGE AREAS(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
130241	8741.1	147.93	211.24	244.11	195.89	117.80	84.95	101.94	92.31	81.45	66.26	65.13	114.21	126.03
130242	9712.5	141.74	226.83	260.51	233.58	127.43	92.03	109.02	99.11	86.54	71.64	71.64	129.97	136.27
130261	176.1	2.75	3.45	3.51	3.31	1.90	1.42	1.47	1.33	0.99	1.04	1.27	2.15	2.02
130262	152.4	2.45	2.61	3.06	2.83	1.55	1.14	1.25	1.13	0.85	0.88	1.08	1.78	1.71
130281	114.0	1.73	1.93	2.12	2.12	1.27	0.85	0.91	0.85	0.65	0.68	0.85	1.33	1.29
130282	38.8	0.59	0.68	0.79	0.71	0.42	0.31	0.31	0.28	0.23	0.23	0.28	0.45	0.44
130261	194.2	3.07	3.42	3.48	3.63	2.07	1.58	1.56	1.42	1.08	1.13	1.39	2.27	2.19
130277	165.4	2.64	2.93	3.36	3.11	1.70	1.40	1.65	1.27	0.96	0.96	1.19	1.98	1.84

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 9712.5
SUM OF SUB-DRAINAGE AREAS = 9584.0

TOTAL FLOW IN = 1640.38
TOTAL FLOW OUT = 1640.39

NOTE *** LAKE AREA=294.5 SQ KM NOT INCLUDED IN SUMS OF SUB-DRAINAGE AREAS

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
130241	3	74	222.38	11	172.73				
	4	74	316.48	14	495.54				
	5	74	141.58	17	109.96				
	6	74	135.63	7	121.75				
	7	74	76.74	11	83.54				
	8	74	71.74	26	55.65				
	9	74	58.55	4	43.44				
	10	74	53.67	19	47.01				
	11	74	56.17	8	44.74				
	12	74	94.54	5	75.49				
	1	75	263.45	7	176.45	26	102.51		
	2	75	343.01	6	484.43	26	622.47		
130282	3	75	96.54	11	142.35				
	4	75	484.61	14	484.57				
	5	75	242.31	25	161.41				
	6	75	206.36	24	165.94				
	7	75	54.22	22	46.37				
	8	75	56.32	26	35.85				
	9	75	58.71	27	115.82				
	10	75	57.77						
	11	75	72.67	15	54.54				
	12	75	75.24	2	97.77				
	1	76	196.52	7	134.41	26	121.75		
	2	76	172.48	6	244.51	26	305.42		

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BASE FLOW INFORMATION FOR GEORGIA

BASE FLOW FOR 1332 [illegible]

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

DATA-ENTRY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
1302+1	3	73	1.95	11	2.47				
	4	73	5.53	13	5.56				
	5	73	3.11	10	5.11				
	6	73	5.40	7	2.32				
	7	73	3.13	11	4.25				
	8	73	1.73	24	0.41				
	9	73	0.56	8	0.75				
	10	73	3.59	13	9.39				
	11	73	5.32	8	5.71				
	12	73	0.45	6	3.45				
	1	74	3.66	7	1.22	20	0.85		
	2	74	3.68	4	3.54	22	3.11		
1302C1	3	73	1.54	11	2.21				
	4	73	5.62	13	2.44				
	5	73	4.11	25	1.33				
	6	73	5.45	23	5.85				
	7	73	1.75	22	0.93				
	8	73	1.47	24	0.52				
	9	73	3.45	27	4.51				
	10	73	0.40						
	11	73	0.57	10	3.51				
	12	73	0.64	2	2.54				
	1	74	1.41	6	0.79	20	0.76		
	2	74	3.63	4	7.08	22	2.15		
1302+1	3	73	1.25	11	1.76				
	4	73	4.28	13	1.98				
	5	73	3.17	25	0.58				
	6	73	3.62	23	4.25				
	7	73	1.27	22	0.60				
	8	73	1.10	24	0.25				
	9	73	3.37	27	4.14				
	10	73	0.34						
	11	73	0.17	10	3.15				
	12	73	0.23	2	3.22				
	1	74	1.23	6	0.28	20	0.27		
	2	74	3.38	4	12.70	22	1.64		
1302E1	3	73	0.97	11	1.59				
	4	73	1.64	13	0.85				
	5	73	1.13	25	0.23				
	6	73	1.63	23	1.77				
	7	73	0.93	22	0.13				
	8	73	0.57	24	0.05				
	9	73	0.83	27	0.23				
	10	73	0.0						
	11	73	1.17	10	0.53				
	12	73	0.35	2	0.58				
	1	74	0.45	6	0.04	20	0.04		
	2	74	0.77	4	0.67	22	0.57		

2.6 A

LAKE CODE 1302 MCCASKILL LAKE

YEAR MONTHLY FLOW - AM PEAK FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	PEAK FLOW	DAY	FLOW	DAY	FLOW
130251	3	73	2.15	11	3.43				
	4	73	1.38	13	3.82				
	5	73	0.67	25	1.73				
	6	73	0.77	24	0.91				
	7	73	0.21	22	1.25				
	8	73	1.34	26	0.71				
	9	73	0.53	27	0.57				
	10	73							
	11	73	0.53	15	0.54				
	12	73	0.76	2	3.48				
	1	74	2.44	6	5.91	20	0.35		
	2	74	3.38	9	11.49	22	2.97		
130251	3	73	.71	11	1.35				
	4	73	2.55	14	1.02				
	5	73	1.47	15	1.65				
	6	73	2.23	23	2.53				
	7	73	.76	11	1.13				
	8	73	.65	8	1.14				
	9	73	.16	4	.14				
	10	73	.17	13	.15				
	11	73	.26	8	.23				
	12	73	.28	4	.24				
	1	74	.65	7	.34	22	0.42		
	2	74	1.27	4	1.27	20	1.19		
130277	3	73	2.45						
	4	73	2.31						
	5	73	2.62						
	6	73	.73						
	7	73							
	8	73	.18						
	9	73	.28						
	10	73	.23						
	11	73	.37						
	12	73	.05						
	1	74	2.24						
	2	74	3.53						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/11/26

130201
31 50 51.0 083 56 27.0
BLACKSHEAR LAKE
13177 GEORGIA

11EPALES
3

2111202
0025 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/22	12 45	0000	28.0		33	80	7.30	26	0.160	1.000	0.280	0.010
	12 45	0005	27.6	4.8		60	7.20	12	0.160	0.800	0.290	0.011
	12 45	0015	27.4	4.4		60	7.10	14	0.140	0.400	0.290	0.013
	12 45	0023	27.4	4.2		60	7.10	13	0.170	0.400	0.300	0.011
73/09/07	14 45	0000	30.2		56	63	7.40	25	0.040	0.800	0.140	0.014
	14 45	0005	29.0	6.6		61	7.40	22	0.030	0.200K	0.140	0.010
	14 45	0020	28.4	5.8		59	7.30	22	0.050	0.200	0.150	0.010
	14 45	0035	27.9	3.8		61	7.20	23	0.080	0.200K	0.190	0.011
73/11/08	11 48	0000	16.8		48	48	7.30	22	0.070	0.600	0.190	0.024
	11 48	0005	16.8	8.6		48	7.60	23	0.060	0.200	0.180	0.022
	11 48	0012	16.7	9.0		48	7.80	23	0.060	0.200	0.180	0.022

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/22	12 45	0000	0.062	2.1
	12 45	0005	0.066	
	12 45	0015	0.070	
	12 45	0023	0.099	
73/09/07	14 45	0000	0.022	4.0
	14 45	0005	0.019	
	14 45	0020	0.020	
	14 45	0035	0.023	
73/11/08	11 48	0000	0.039	1.0
	11 48	0005	0.032	
	11 48	0012	0.037	

K= VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 74/11/26

130202
31 54 26.0 083 55 28.0
BLACKSHEAR LAKE
13177 GEORGIA

11FPALES
3

2111202
0039 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/22	13	20 0000	27.5		12	58	7.10	12	0.150	0.700	0.280	0.018
	13	20 0005	27.4	4.6		55	7.10	14	0.150	0.400	0.310	0.014
	13	20 0015	27.1	4.5		55	7.00	10	0.170	0.400	0.300	0.017
	13	20 0035	26.9	3.6		55	7.00	16	0.260	0.500	0.380	0.063
73/09/07	14	25 0000	28.9		47	60	7.40	20	0.060	0.600	0.170	0.008
	14	25 0005	28.4	6.0		64	7.40	21	0.060	0.400	0.170	0.009
	14	25 0015	28.2	5.8		64	7.30	21	0.060	0.300	0.170	0.010
	14	25 0020	28.2	5.0		62	7.30	19	0.080	0.300	0.180	0.013
73/11/08	12	00 0000	16.8		38	48	7.60	26	0.060	0.300	0.180	0.016
	12	00 0005	16.6	8.8		48	7.70	27	0.060	0.200K	0.180	0.022
	12	00 0015	16.6			48						
	12	00 0020	16.6	9.0		48	7.40	27	0.060	0.200	0.180	0.022

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/22	13	20 0000	0.099	1.9
	13	20 0005	0.101	
	13	20 0015	0.103	
	13	20 0035	0.094	
73/09/07	14	25 0000	0.019	2.3
	14	25 0005	0.020	
	14	25 0015	0.021	
	14	25 0020	0.022	
73/11/08	12	00 0000	0.030	0.8
	12	00 0005	0.029	
	12	00 0020	0.033	

K* VALUE KNOWN TO BE LESS
THAN INDICATED

30

STORET RETRIEVAL DATE 74/11/26

130203
31 56 50.0 083 55 35.0
BLACKSHEAR LAKE
13261 GEORGIA

11EPALES
3

2111202
0019 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/22	13 50	0000	27.3		12	60	7.10	16	0.130	0.700	0.310	0.011
	13 50	0005	27.2	5.3		58	7.10	15	0.160	0.600	0.310	0.014
	13 50	0016	27.0	3.3		81	6.90	28	0.170	0.400	0.440	0.022
73/09/07	14 00	0000	30.0		15	59	7.20	19	0.060	0.500	0.190	0.009
	14 00	0005	29.0	6.4		59	7.30	18	0.050	0.300	0.200	0.010
	14 00	0020	28.3	6.2		59	7.40	18	0.080	0.400	0.200	0.014
73/11/08	12 18	0000	15.7		34	46	7.70	24	0.070	0.200	0.180	0.019
	12 18	0005	16.5	9.0		47	7.60	21	0.060	0.200	0.180	0.014
	12 18	0010	16.5	9.0		46	7.00	20	0.060	0.200	0.170	0.023

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/22	13 50	0000	0.090	2.5
	13 50	0005	0.040	
	13 50	0016	0.103	
73/09/07	14 00	0000	0.020	2.0
	14 00	0005	0.020	
	14 00	0020	0.024	
73/11/08	12 18	0000	0.036	0.7
	12 18	0005	0.035	
	12 18	0010	0.035	

STORET RETRIEVAL DATE 74/11/26

130204
32 00 00.0 083 57 14.0
BLACKSHEAR LAKE
13261 GEORGIA

11EPALES
3

2111202
0011 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/06/22	14 15	0000	27.7		21	60	7.10	19	0.170	0.500	0.310	0.007
	14 15	0005	27.4	5.2		55	7.00	17	0.180	0.400	0.330	0.008
	14 15	0009	27.3	5.4		55	7.00	16	0.140	0.400	0.320	0.007
73/09/07	13 45	0000	28.7		35	56	7.00	17	0.070	1.000	0.160	0.017
	13 45	0005	28.2	6.2		56	7.20	17	0.050	0.300	0.170	0.014
	13 45	0012	28.2	5.8		56	7.10	17	0.060	0.300	0.180	0.021

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/06/22	14 15	0000	0.064	1.2
	14 15	0005	0.064	
	14 15	0009	0.070	
73/09/07	13 45	0000	0.031	1.9
	13 45	0005	0.029	
	13 45	0012	0.038	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 74/12/04

1302A1 1302A1
32 03 30.0 083 59 00.0
FLINT RIVER
13057 SUMTER CO HWY MA
I/BLACKSHEAR LAKE
LUTHER STORY BRDG ON RT 27
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/11	14 46		0.176	1.050	0.150	0.013	0.050
73/04/14	09 45		0.120	1.200	0.056	0.023	0.060
73/05/10	13 15		0.190	4.300	1.370	0.021	0.075
73/06/07	17 45		0.240	2.800	0.138	0.015	0.045
73/07/11	18 15		0.210	0.340	0.034	0.049	0.080
73/08/24	18 45		0.189	0.380	0.032	0.029	0.067
73/09/08	09 30		0.168	0.240	0.064	0.011	0.040
73/10/13	09 30		0.200	0.250	0.039	0.017	0.055
73/11/08	18 45		0.160	0.300	0.038	0.011	0.030
73/12/06	18 45		0.580	0.500	0.024	0.016	0.095
74/01/07	09 00		0.152	0.400	0.025	0.025	0.100
74/01/20	18 45		0.152	0.500	0.055	0.025	0.158
74/02/04	13 40		0.076	0.300	0.040	0.025	0.080
74/02/20	15 10		0.132	1.000	0.125	0.025	0.080

STORET RETRIEVAL DATE 74/12/04

1302A2 1302A2
31 41 09.0 083 56 30.0
FLINT RIVER
13 NORTH CO HWY 4AP
0/BLACKSHEAR CREEK
BANK SAMPLE FROM NORTH CO SIDE BELO DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/11	09 31		0.240	0.410	0.038	0.009	0.025
73/04/14	17 20		0.120	0.540	0.110	0.030	0.070
73/05/25	18 35		0.198	0.480	0.034	0.011	0.040
73/06/23	10 18		0.180	0.420	0.027	0.026	0.060
73/07/22	11 23		0.120	0.360	0.049	0.010	0.030
73/08/24	18 00		0.130	0.330	0.040	0.013	0.030
73/09/27	19 05		0.150	0.210	0.075	0.010	0.035
73/11/10	10 40		0.160	0.350	0.030	0.012	0.045
73/12/02	13 38		0.240	0.100	0.028	0.016	0.075
74/01/07	13 18		0.252	0.200	0.045	0.027	0.050
74/01/20	14 50		0.176	0.200	0.035	0.015	0.040
74/02/04	15 20		0.175	0.300	0.035	0.020	0.050
74/02/20	13 30		0.150	0.300	0.035	0.025	0.065

STORET RETRIEVAL DATE 74/12/04

130281 130281
32 02 00.0 043 59 30.0
LIME CREEK
13 SUMTER CO HWY 48
T/BLACKSHEAR LAKE
RADS ON SEC RD 2 MI N SPRING GROVE CHURC
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/11	15 20		0.150	1.700	0.065	0.005K	0.015
73/04/13	10 05		0.170	1.380	0.052	0.008	0.025
73/05/10	18 25		0.132	1.300	0.058	0.020	0.060
73/06/07	18 05		0.154	0.750	0.154	0.017	0.075
73/08/24	19 00		0.110	0.320	0.030	0.010	0.030
73/09/08	10 00		0.220	0.300	0.050	0.006	0.025
73/10/13	09 15		0.050	0.150	0.019	0.008	0.020
73/11/08	17 00		0.058	0.300	0.023	0.005K	0.025
73/12/06	19 00		0.100	0.100	0.016	0.008	0.020
74/01/07	08 30		0.144	0.300	0.025	0.005	0.025
74/01/20	19 00		0.160	0.200	0.020	0.010	0.040
74/02/04	14 00		0.120	0.200	0.025	0.010	0.025
74/02/20	16 50		0.880	0.500	0.060	0.035	0.085

K= VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 74/12/04

13202C1 13202C1
31 50 30.0 083 53 00.0
SWIFT CREEK
13 CRISP CO HWY MAP
T/BLACKSHEAR LAKE
BRDG ON SEC RD 1 M S OF BRIDGES CENTER
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/11	09 10		1.060	3.000	0.120	0.006	0.020
73/04/13	17 00		0.930	0.720	0.082	0.015	0.040
73/05/25	18 20		0.550	0.720	0.029	0.009	0.015
73/06/23	10 00		1.040	0.690	0.075	0.010	0.060
73/07/22	11 15		1.300	0.230	0.027	0.006	0.010
73/08/24	17 45		1.440	0.100K	0.022	0.008	0.015
73/09/27	18 50		1.120	0.100K	0.044	0.006	0.015
73/11/10	10 25		0.920	0.100K	0.006	0.005K	0.020
73/12/02	13 20		0.940	0.400	0.012	0.005K	0.035
74/01/06	13 05		0.990	0.600	0.010	0.005K	0.015
74/01/20	14 35		1.040	0.200	0.020	0.005	0.020
74/02/08	15 05		0.144	0.700	0.027	0.027	0.130
74/02/22	13 15		0.600	2.800	0.910	0.015	0.045

K* VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 74/12/04

130201 130201
31 55 00.0 083 53 30.0
CROSS CREEK
13 CRISP CO HWY 280
17 ALLACKS NEAR LAKE
1ST XING 3 MI SSW OF CONEY
11 PALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO3&NO2 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/11	09 50		0.470	1.500	0.082	0.009	0.025
73/04/13	17 40		0.430	1.470	0.220	0.014	0.035
73/05/25	18 50		1.450	0.450	0.056	0.024	0.035
73/06/23	10 45		0.330	0.400	0.040	0.044	
73/07/22	11 45		0.530	0.430	0.027	0.007	0.023
73/08/24	14 15		0.500	0.560	0.025	0.007	0.020
73/09/27	13 20		0.240	1.100	0.132	0.005	0.025
73/11/10	10 55		0.230	0.525	0.032	0.005*	0.010
73/12/02	14 00		0.115	0.100*	0.004*	0.005*	0.025
74/01/06	13 40		0.170	0.200	0.015	0.005*	0.025
74/01/20	15 05		0.134	0.530	0.005*	0.005	0.035
74/02/08	15 35		0.134	0.530	0.020	0.020	0.110
74/02/22	13 45		0.340	0.420	0.050	0.015	0.035

* VALUE KNOWN TO BE LESS THAN INDICATED

STORET RETRIEVAL DATE 74/12/04

13025 13025
31 55 30.0 083 53 30.0
GULLY CREEK
13 CRISP CO HWY MAP
1/BLACKSHEAR LAKE
HWY BRDG 1 MI S OF CONEY
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/11	10 00		1.360	2.300	0.115	0.012	0.025
73/04/13	17 50		1.600	1.100	0.130	0.019	0.035
73/05/25	18 55		1.420	1.150	0.058	0.030	0.075
73/06/23	10 52		0.550	0.830	0.120	0.154	0.470
73/07/22	11 50		2.300	0.190	0.021	0.016	0.030
73/08/24	18 25		1.200	0.330	0.018	0.020	0.035
73/09/27	19 30		1.800	0.720	0.138	0.198	0.345
73/11/10	11 00		0.730	0.750	0.052	0.042	0.095
73/12/02	14 10		0.028	0.400	0.008	0.012	0.085
74/01/06	13 50		3.780	0.500	0.055	0.015	0.035
74/01/20	15 10		2.940	0.700	0.025	0.010	0.045
74/02/08	15 45		0.460	0.550	0.020	0.050	0.115
74/02/22	13 50		0.880	0.500	0.020	0.020	0.055

STORET RETRIEVAL DATE 74/12/04

13302FL 13302FL
31 57 30.0 083 53 00.0
GUM CREEK
13 CRISP CO HWY MAP
T/BLACKSHEAR LAKE
MT 30 NW06 IN CONEY
11FWALES 2111204
0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 N02&N03 I-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/11	10	02	1.260	0.330	0.110	0.170	0.240
73/04/13	14	00	1.140	0.320	0.130	0.150	0.250
73/05/25	14	25	1.360	0.780	0.084	0.240	0.335
73/06/23	11	00	0.690	0.420	0.078	0.170	0.421
73/07/22	12	32	1.740	0.420	0.033	0.273	0.330
73/08/24	14	35	1.720	1.430	0.074	0.400	0.450
73/09/27	14	40	1.400	0.240	0.050	0.490	0.600
73/11/10	11	35	1.330	0.350	0.027	0.490	0.830
73/12/02	14	20	1.600	0.500	0.020	0.500	0.560
74/01/06	13	55	2.120	0.600	0.155	0.630	0.780
74/01/20	15	20	2.700	0.400	0.040	0.540	0.640
74/02/08	15	55	1.440	1.100	0.300	0.220	0.470
74/02/22	14	05	1.200	0.700	0.110	0.200	0.315

STORET RETRIEVAL DATE 74/12/04

130261 130261
32 01 00.0 083 56 00.0
LIMESTONE CREEK
13 CRISP CO HWY MAP
T/BLACKSHEAR LAKE
BRDG ON RT 230 NNW OF CONEY
11FWALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/11	14	23	0.730	1.400	0.105	0.023	0.050
73/04/14	09	30	0.830	0.510	0.048	0.023	0.050
73/05/10	17	50	0.590	0.690	0.025	0.024	0.065
73/06/23	17	30	0.473	0.800	0.280	0.063	
73/07/11			0.620	0.290	0.022	0.025	0.050
73/08/08	18	30	1.000	0.100K	0.017	0.016	0.040
73/09/08	09	15	0.810	0.160	0.048	0.015	0.035
73/10/13	09	40	0.840	0.100K	0.020	0.018	0.035
73/11/08	18	30	0.720	0.300	0.013	0.013	0.025
73/12/06	18	30	0.583	0.100K	0.008	0.012	0.045
74/01/07	09	30	0.860	0.100K	0.030	0.030	0.035
74/01/22	18	15	0.810	1.400	0.025	0.035	0.075
74/02/04	13	30	0.850	0.600	0.045	0.040	0.080
74/02/20	15	25	0.248	0.800	0.090	0.015	0.035

K* VALUE KNOWN TO BE LESS
THAN INDICATED

STORET RETRIEVAL DATE 75/01/06

1302FA TF1302FA P011000
31 59 00.0 083 47 30.0
COPDELE
13 CHISP CO HWY MAP
T/BLACKSHEAR LAKE
GUM CREEK
LIFDALES
4 2141204
0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/12/21	09 00		7.000	12.000	0.560	7.400	9.100	2.500	2.500
74/01/18	11 30		11.800	21.000	1.920	7.560	8.600	2.500	2.500
74/02/18	10 00		5.700	2.000	1.200	2.080	2.500	2.500	2.500
74/03/18	08 30		4.100	2.300	0.450	5.750	6.200	2.500	2.500
74/05/14	08 30		8.000	6.000	0.470	5.600	6.400	2.500	2.500
74/06/19	09 30		12.000	5.300	0.730	6.300	7.300	2.500	2.500
74/07/22	08 30		0.040	3.700	0.500	6.000	6.600	2.500	2.500
74/08/20	09 00		0.240	6.200	0.170	0.280	7.600	2.500	2.500
74/09/26	08 00		5.100	8.500	0.630	5.800	6.400	2.500	2.500
74/10/22	10 00			6.600	0.770		8.500	2.500	2.500
74/11/19	09 00			13.500			9.050	2.500	2.500

STORET RETRIEVAL DATE 75/01/06

130221 PR130221 P004000
32 16 00.0 08A 04 00.0
MONTEZUMA #1
13261 MACON CO HWY MAP
T/LAKE BLACKSHEAR
SPRING CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/05/01	11 00								
CP(T)-			0.775	16.000	5.400	2.600	4.500		
73/05/01	16 00								
73/05/04	11 00								
CP(T)-			0.125	12.000	4.300	3.200	5.700	0.318	0.446
73/05/04	16 00								
73/05/29	10 00								
CP(T)-			0.115	11.500	6.200	3.500	4.900	0.135	0.259
73/05/29	15 00								
73/07/27	09 00								
CP(T)-			0.040	12.000	4.700	5.400	7.200	0.198	0.207
73/07/27	15 00								
73/08/23	10 00								
CP(T)-			0.032	16.000	5.900	4.510		0.339	0.331
73/08/23	15 00								
73/09/26	09 00								
CP(T)-			0.040	25.000	14.700	5.300	7.100	0.134	0.261
73/09/26	15 00								
73/10/22	10 00								
CP(T)-			0.072	20.000	8.900	5.400	7.800	0.124	0.102
73/10/22	15 00								
73/11/27	09 00								
CP(T)-			1.260	19.400	5.300	3.570	9.050	0.130	0.112
73/11/27	15 00								
73/12/27	09 00								
CP(T)-			0.840	19.500	6.900	4.900	8.600	0.176	0.158
73/12/27	15 00								
74/01/22	09 00								
CP(T)-			1.840	15.000	5.520	2.080	3.200	0.246	0.182
74/01/22	15 00								
74/02/21	09 00								
CP(T)-			0.200	7.700	1.650	1.200	2.200	0.089	0.148
74/02/21	15 00								
74/03/21	09 00								
CP(T)-			0.480	22.000	8.500	3.150	4.450	0.178	0.174
74/03/21	14 00								

STORET RETRIEVAL DATE 75/01/06

130221 PR130221 P004000
32 16 00.0 084 04 00.0
MONTEZUMA #1
13261 MACON CO HWY MAP
T/LAKE BLACKSHEAR
SPRING CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/04/24	09 00								
CP(T)-			0.440	9.400	4.200	1.550	2.300	0.146	0.134
74/04/24	15 00								

STORET RETRIEVAL DATE 75/01/06

130222 AS130222 P000080*
32 16 00.0 084 04 00.0
MONTEZUMA #2
13 MACON CO HWY MAP
T/LAKE BLACKSHEAR
SPRING CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/05/01	11	00							
CP(T)-			0.030	3.100		1.895	2.300	0.832	0.842
73/05/01	16	00							
73/06/04	11	00							
CP(T)-			5.300	3.800	0.320	4.100	4.600	0.906	0.761
73/06/04	16	00							
73/06/28	10	00							
CP(T)-			2.400	3.400	0.300	2.500	3.000	0.895	0.714
73/06/28	15	00							
73/07/27	09	00							
CP(T)-			0.080	2.700	0.280	1.600	2.000	1.660	1.190
73/07/27	15	00							
73/08/23	10	00							
CP(T)-			0.600	2.000	0.116	1.280	1.800	1.340	0.976
73/08/23	15	00							
73/09/26	09	00							
CP(T)-			1.540	4.900	0.590	4.200	4.900	1.110	0.965
73/09/26	15	00							
73/10/22	10	00							
CP(T)-			0.399	3.000	0.044	1.200	1.800	0.656	1.440
73/10/22	15	00							
73/11/27	09	00							
CP(T)-			1.680	6.600	0.064	1.260	1.500	0.749	1.150
73/11/27	15	00							
73/12/27	09	00							
CP(T)-			0.460	4.500	0.130	0.450	0.760	0.019	0.082
73/12/27	15	00							
74/01/22	09	00							
CP(T)-			0.320	6.400	0.220	0.360	0.830	0.262	0.330
74/01/22	15	00							
74/02/21	09	00							
CP(T)-			2.080	2.000	0.060	0.830	1.150	0.593	0.486
74/02/21	15	00							
74/03/21	09	00							
CP(T)-			1.440	5.900	0.180	1.820	2.387	0.886	0.305
74/03/21	14	00							

4C-A

STORET RETRIEVAL DATE 75/01/06

130222 AS130222 P000080*
32 16 00.0 084 04 00.0
MONTEZUMA #2
13 MACON CO HWY MAP
T/LAKE BLACKSHEAR
SPRING CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/04/26	09 00								
CP(T)-			0.400	4.600	0.220	1.450	2.100	0.980	0.501
74/04/26	15 00								